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(54) A thread delivery device for textile machinery

(57) The thread delivery device is provided with a thread storage drum (17) which has, above a frustoconical thread run-in region (33), a shallow frustoconical thread run-on or reception region (32) and, beneath the thread run-in region (33), a cylindrical or slightly tapering thread storage region (34) which ends in a bead-free drum edge (35). A thread-feed guiding element (25) is so arranged that the thread (28) is always directed obliquely from above tangentially onto the thread run-on region (32), and a thread-draw-off guiding element (26) for tangential thread draw-off is so arranged that the thread (28) is lifted off from the thread storage drum (17) above the bead-free lower drum edge (35) at a shallow angle δ to the last thread coil (39). The guiding elements (25, 26) may be adjustable in height and yarn sensors may be provided adjacent the elements.

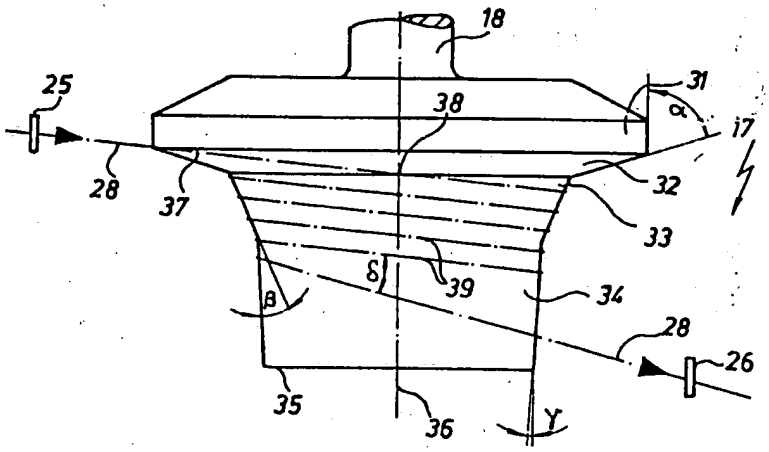

Fig. 2

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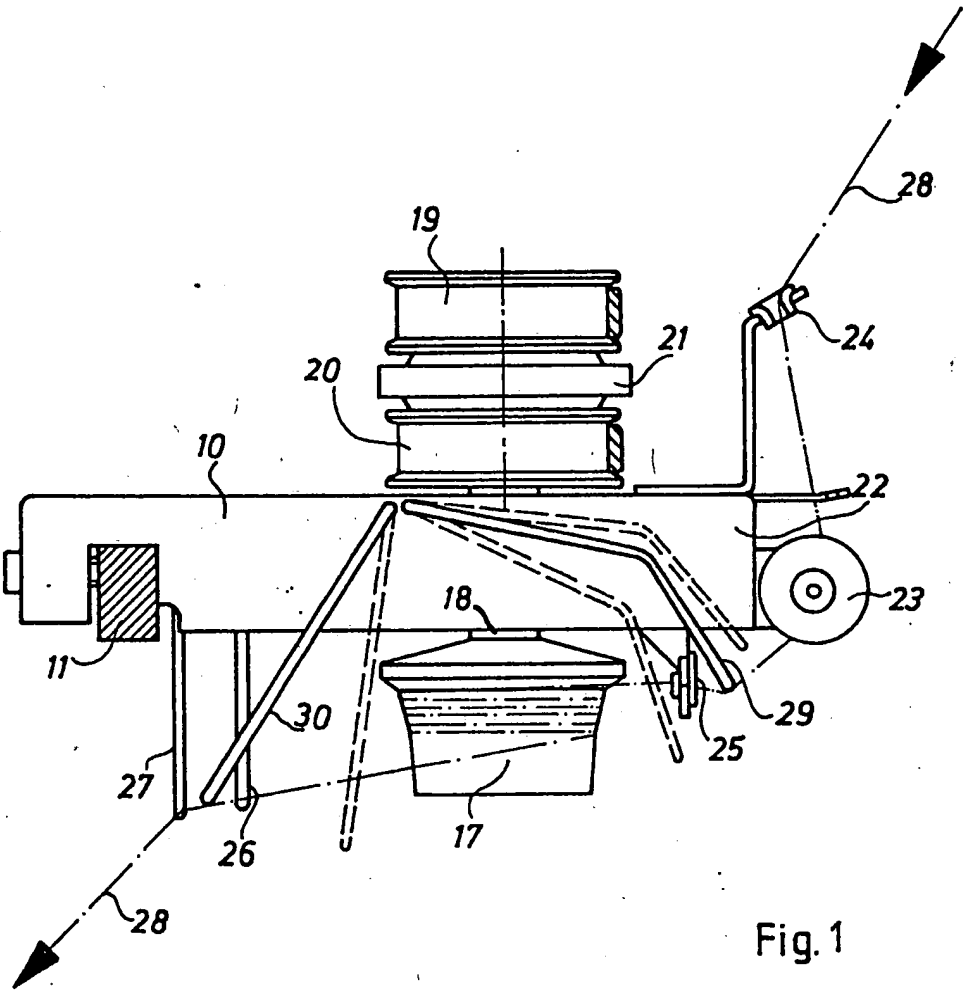

Fig. 1

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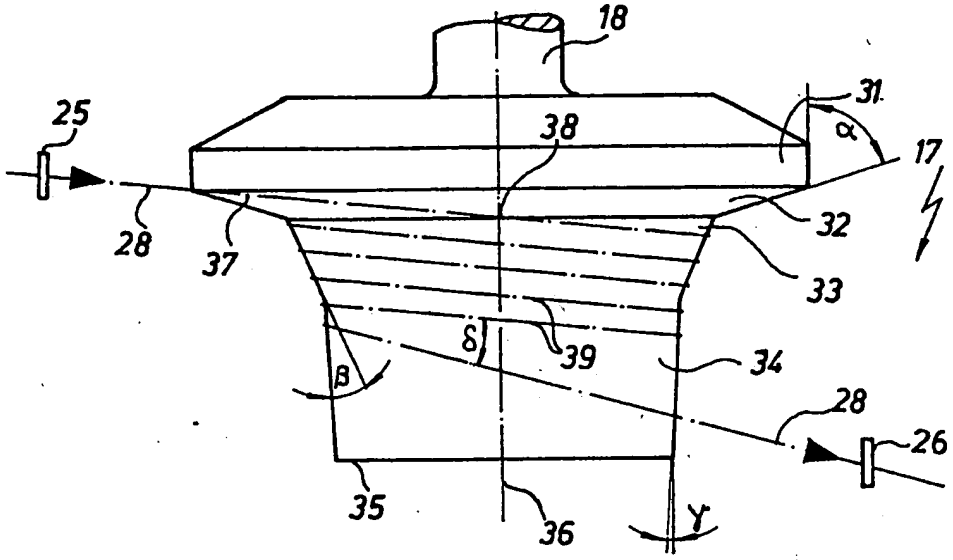
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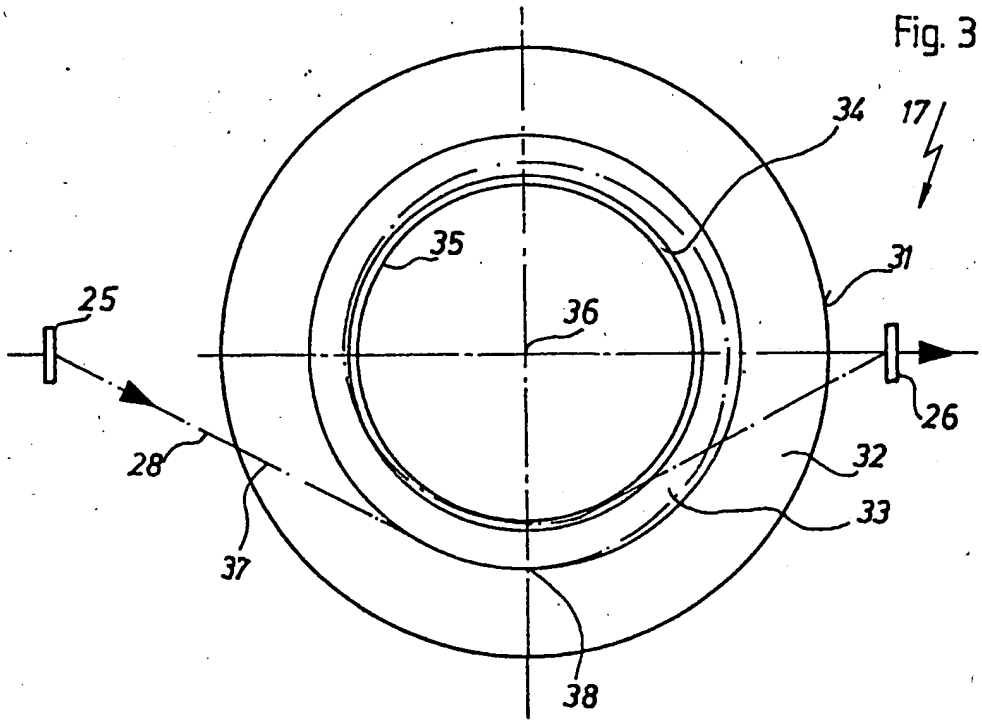
25
38
α
17
28
37
32
33
δ
39
34
β
28
26
35
36
γ

Fig. 2

Fig. 3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SPECIFICATION

A thread delivery device for textile machinery

This invention relates to a thread delivery device for textile machinery comprising a drivable thread storage drum which is mounted rotatably on a substantially vertical axis and which has, in its upper part, a frustoconical thread run-in region and a cylindrical thread storage region linking downwardly thereto.

Thread delivery devices having the aforesaid thread storage drum features are known, for example, from German Patent Specification No. 17 60 738.

On textile machinery, threads are processed which, by reason of different production material, such as for example cotton, wool, synthetic fibre material, or different processing and finish, for example smooth threads, twisted yarns, rippled threads or yarns, elastic threads, may have very different properties, which affect the functioning of thread delivery devices in different ways. In order to make allowance for these different thread properties, various storage drum profiles for thread delivery devices have been proposed. These are supposed to ensure that the thread is shifted on the thread storage drum in a single coil layer from a feed location to a draw-off location, without the thread coils overlapping one another and hindering an orderly draw-off of the thread from the storage drum.

The basic underlying object of the present invention is to design a thread delivery device which will ensure an orderly course of thread coils on the thread storage drum for all threads arriving at the device for processing.

More specifically, the object is to design the thread storage drum of the thread storage device in such a way that even yarns with a severe fibre abrasion are reliably guided and cannot cause any disturbance to the thread delivery device since it has been shown that, with close mutual abutment on the thread storage drum of the coils of yarns which have an extreme tendency to unravel or fray, severe fibre end interlacing can take place such that orderly thread draw-off from the storage drum is prevented. Moreover, in the case of such yarns, fibres becoming free on the thread storage drum form, at the lower drum edge (which is customarily provided with a bead for guidance of the thread and for protection against a falling-off of thread coils from the thread storage drum), a fibre ring into which the thread can work, which ring may act like a coarse braking ring and may lead to the tearing of the thread.

The object is achieved with a thread delivery device of the kind mentioned at the beginning her of, in accordance with the invention in that a shall wer frustoconical thread run-on r reception region is f rmed above the frustoc nical thread run-in region, in that th cylindrical thread storage regi n ends in a bead-free l wer drum edge, in that a thread-fee guiding element (25) is so arranged that th thread is brought obliquely from ab ve and tangentially onto the thread run-on region, and in that a thread draw-off guiding element enabling a tangential thread draw-off is so arranged that the thr ad is lifted off from the cylindrical thread storag region above the bead-free lower drum edge at a shallow angle to a plane determined by the lowermost complete thread coil.

Thus, in the case of the thread delivery device designed in accordance with the invention, the thread or the yarn is fed to the thread storage drum in such a way that it first touches the shallower frustoconical thread run-on or reception region. In so doing, as a result of this flat contact the thread or the yarn is calmed and immediately experiences a deflecting motion, unhindered by adhesive friction forces, in the axial direction causing it to run-up onto the connecting steeper frustoconical thread run-in region of the thread storage drum. The initial contact with the shallow frustoconical thread run-on region is, however, sufficient to impart to the arriving yarn a twisting motion about its longitudinal axis, which motion brings about consolidation of the yarn surface in the sense of better binding of protruding fibre ends. The effect of the thread run-up onto the thread run-in region being facilitated by the preceding shallow thread run-on region of the thread storage drum is that the thread coils proceed over the conical thread run-in region without noticeable lateral pressure on one another, and generally even without mutual contact, with the result that, even at the subsequent transitional point from the conical thread run-in region into the cylindrical thread storage region, the lateral pressure which the thread coils exert on one another on the cylindrical thread storage region remains within limits. This advantage can be further enhanced if the thread storage region of the thread storage drum is not exactly cylindrical, but is designed with a slight tapering towards the bead-free lower edge on the thread storage drum.

Fibres and fibre abrasion detritus which become free and collect on the outer surface of the drum can no longer collect at the bead-free lower drum edge. They either drop down over the lower drum edge or are pushed down. The danger of the formation of fibre rings into which the drawn-off thread can work is thus abolished.

With respect to the basic object of ensuring satisfactory functioning of the thread delivery device in the case of all possible kinds of yarn and thread and also with respect to the more specific object mentioned at the beginning hereof, it has turned out to be advantageous to select the conicity and length of the frustoconical thread run-in region in relation to the diameter of the subsequent cylindrical thread storage region of the storage drum in such a way that, upon run-off over the downwardly-tapering thread run-in region, the thr ad can experience a length shrinkage of 2% at the m st. This means, in the case of yarns which have an extrem tendency to unravel and which have twisting m tion ab ut their l ngitudinal axis impart d to them by the initial shallow thread run-on region, that they can experi nce, during their course over the steeper c nical thread run-in region, because of the decreasing coil diameter in the

thread run-in region, only a partial twisting back so that they pass with an adequate residual tension onto the cylindrical thread storage region. The residual tension prevents the thread coils falling off the bead-free lower edge of the storage drum even in the event of a thread breakage in the thread travel direction behind the thread storage drum. The same effect occurs with extremely low-elongation yarns and threads having flexibility which is sufficient for a stitch formation on a knitting or weaving machine.

Advantageously, the conicity ratio between the shallower thread run-on region and the steeper thread run-in region of the storage drum is about 10:1 and the apical angle of the frustoconical run-in region is about 14°.

Preferably the thread storage drum has a smooth closed outer surface surface area. A known drum with a rough outer surface in the region of the cylindrical thread storage region can possibly be of advantage in the case of completely unelastic smooth plastics threads having reduced flexibility. However these are no longer used for knitted and woven fabrics.

An exemplified embodiment of a thread delivery device in accordance with the invention will be described in more detail hereinunder with reference to the accompanying drawings, in which:

Fig. 1 is a schematic side view of a thread delivery device;

Fig. 2 is a side view of only the thread storage drum of the thread delivery device of Fig. 1 to an enlarged scale; and

Fig. 3 is an axial view of the thread storage drum of Fig. 2.

The thread delivery device shown in Fig. 1 includes a housing 10 which is designed as a hollow body and which is releasably fastened at one side to a mounting rail 11 of a textile machine. A thread storage drum 17 which will be described in more detail in connection with Figs. 2 and 3 is disposed beneath the housing 10. The thread storage drum 17 is connected securely to a shaft 18, which extends vertically through the housing 10 and is mounted in the housing 10. Mounted on that part of the shaft 18 which projects beyond the upper side of the housing 10 are two belt pulleys 19 and 20, which can be selectively coupled with the shaft 18 by means of an axially adjustable coupling disc 21 arranged therebetween.

Frontally a thread brake 23 is arranged at the other side 22 of the housing 10 and disposed above the thread brake 23 is a first thread guiding eye 24 which is connected securely to the housing 10. Mounted on the underside of the housing 10, in front of the thread storage drum 17 in the thread passage direction, is a thread feed guiding eyelet 25, and arranged one behind the other behind the thread storage drum 17 in the thread travel direction are two thread draw-off guiding elements 26 and 27, which bring about tangential draw-off of the thread 28 (shown by a dot-dash line) from the thread storage drum 17. Incorporated into the housing 10 of the thread delivery device are known thread monitoring mechanisms, namely an unravelling and/or thread-breakage monitoring mechanism, which controls the thread in front of the thread storage drum 17 by means of a yoke-like sensor or feeler 29 which butts against the thread, and a thread-breakage monitoring mechanism, which is arranged behind the thread storage drum 17 in the thread passage direction and has a yoke-like sensor or feeler 30 which rests on the thread 28 between the two thread draw-off guiding elements 26 and 27. The sensors 29 and 30 are shown by broken lines in positions in which they effect a switch-off of a textile machine and of a driving device for the thread storage drum 17 on account of thread breakage or thread tension being too great.

The thread storage drum 17 which is shown by itself in Figs. 2 and 3, has an upper edge disc 31. Connecting downwardly to this edge disc 31 is a shallow frustoconical thread reception or run-on region 32 for the thread 28 emerging from the thread-feed guiding eyelet 25. In the illustrated embodiment the outer surface of this conical thread run-on region 32 forms an angle of 75° with the vertical, i.e. has a half cone apex angle of 75°. Connecting to the thread run-on region 32, which is relatively short in the axial direction, is a steeper frustoconical thread run-in region 33 which is somewhat longer in the axial direction and which merges into a longer substantially cylindrical thread storage region 35 culminating in a bead-free lower drum edge 35. The transition from the frustoconical thread run-in region 33 into the cylindrical thread storage region 34 may be curved in design, in other words without a circumferential break line. In the illustrated embodiment, the thread storage region 34 tapers slightly in the direction of the bead-free lower drum edge 35 with a conicity of less than 1/4° (angle γ). The steep frustoconical thread run-in region 33, in the illustrated embodiment, forms an angle β of 7° with the vertical, i.e. possesses a cone apex angle of 14°.

The position of the thread-feed guide eyelet 25 in the direction of the axis of rotation 36 of the thread storage drum 17 and in its spacing from this axis is so selected that the thread 28 is directed onto the thread run-on region 32 of the thread storage drum 17 from obliquely above and at a shallow angle and touches it for the first time approximately at the location 37, shown in Figs. 2 and 3. After only a short distance the thread 28 moves over, at location 38 onto the steeper thread run-in region 33, on which the thread 28 unwinds in spaced-apart coils 39 which continue in fairly close succession over the subsequent thread storage region 34. The thread draw-off guiding element 26 is, in its position in the axial direction and in its distance from the axis of rotation 36, so arranged that the thread 28 is drawn off through it from above the lower bead-free drum edge 35. The thread 28 is also drawn off tangentially from the outer surface of the thread storage region 35 and at an angle δ to the plane formed by the last complete thread coil 39.

The thread-feed guide eyelet 25 can be designed so as to be adjustable in height in the axial direction of the thread storage drum 17 within a region which ensures that the thread 28 in each case first contacts the thread storage drum in the thread run-on region

32, but with a varied abutment point 37. Also the tw thread draw-off guid elements 26 and 27 can be designed s as to be adjustable in height to vary the draw-off angle δ.

CLAIMS

1. A thread delivery device for textile machinery comprising a drivable thread storage drum which is mounted rotatably on a substantially vertical axis and which has, in its upper part, a frustoconical thread run-in region and a cylindrical thread storage region linking downwardly thereto, characterised in that a shallower frustoconical thread run-on or reception region is formed above the frustoconical thread run-in region, in that the cylindrical thread storage region ends in a bead-free lower drum edge, in that a thread-feed guiding element (25) is so arranged that the thread is brought obliquely from above and tangentially onto the thread run-on region, and in that a thread draw-off guiding element enabling a tangential thread draw-off is so arranged that the thread is lifted off from the cylindrical thread storage region above the bead-free lower drum edge at a shallow angle to a plane determined by the lowermost complete thread coil.

2. A thread delivery device as claimed in claim 1, characterised in that the conicity and length of the frustoconical thread run-in region in relation to the diameter of the subsequent cylindrical thread storage region of the thread storage drum are so selected that the thread, upon run-off over the downwardly-tapering thr ad run-in region can xperienc a length shrinkage of 2% at the most.

3. A thread delivery devic as claimed in claim 1 or 2, characterised in that th conicity ratio betw en the shallower thread run-on or reception region and the steeper thread run-in region of the thread storage drum amounts to about 10:1.

4. A thread delivery device as claimed in claim 1, 2 or 3, characterised in that the apical angle of the frustoconical thread run-in region amounts to 14°.

5. A thread delivery device as claimed in any preceding claim, characterised in that the thread storage region tapers slightly from the frustoconical thread run-in region towards the bead-free lower edge of the thread storage drum.

6. A thread delivery device as claimed in claim 5, characterised in that the tapering is effected uniformly with a conicity of less than 1/4°.

7. A thread delivery device as claimed in any preceding claim, characterised in that the thread storage drum has a closed outer surface surface area.

8. A thread delivery device as claimed in any preceding claim, characterised in that the thread-feed guiding element and/or the thread draw-off guiding element are arranged so as to be adjustable in height in a limited region with respect to the thread storage drum.

9. A thread delivery device for textile machinery substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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